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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/823,483

04/12/2004

Avto Tavkhelidze

4951

7590 10/26/2007
Borealis Technical Limited
23545 NW Skyline Blvd
North Plains, OR 97133-9204

EXAMINER

TAMAI, KARL I

ART UNIT	PAPER NUMBER
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2834

MAIL DATE	DELIVERY MODE
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10/26/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/823,483

Applicant(s)

TAVKHELIDZE ET AL.

Examiner

Tamai I.E. Karl

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-7 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shakouri et al. (Shakouri)(US 5955772) and Fitzpatrick ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat Pipe Isothermal Emitters", in further view of Huffman ("Preliminary Investigations of a Thermotunnel Converter"). Shakouri teaches a vacuum thermionic heat pump with a cathode and anode 12, 16 spaced from each other across a vacuum 14, and an external circuit with a power source. Sakouri teaches spacing of .01 to 1 micron (100-10K Angstroms)(col. 7, line 49). Shakouri

teaches every aspect of the invention but does not teach a positioning means for positioning the electrodes or capacitor sensors or the spacing being less than 200 Angstroms. Fitzpatrick teaches a capacitor sensors and piezoelectric actuators (see page 924) to position the electrodes in a thermal energy transfer device. Fitzpatrick teaches three sensors and three actuators to maintain the parallel surfaces, which suggests independent control of the actuator by the microprocessor. Huffman teaches the closing spaced electrodes cause a qualitative increase in the operation of thermionic devices, such as 10 angstroms. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the heat pump of Shakouri with the actuators of Fitzpatrick to provide adjustable electrodes of increased efficiency and power density, and with the spacing being less that 200 Angstroms to causing tunneling to improve the qualitative operation of the device as taught by Huffman.

4. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shakouri et al. (Shakouri)(US 5955772) and Fitzpatrick ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat Pipe Isothermal Emitters") and Huffman , in further view of Richards (US 4281280). Shakouri, Fitzpatrick, and Huffman teach every aspect of the invention except the inert gas argon between the electrodes. Richards teaches the region between the electrodes can be either evacuated or filled with an inert gas such as argon to transport energy from the emitter to the collector. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the machine of Shakouri, Fitzpatrick, and Huffman with the region

between the electrodes being evacuated or filled with argon because Richards teaches that the vacuum or argon allows the transportation of electrons from the cathode to the anode, and because it has been held that selection of known equivalents is within the ordinary skill in the art.

Response to Arguments

Applicant's arguments filed 8/14/2007 have been fully considered but they are not persuasive. Applicant's argument that Huffman teaches the spacing of less than .001 cm is not possible provides evidence of reasonable expectation of success is not persuasive. Sakouri teaches spacing of .01 to 1 micron (100-10K Angstroms)(col. 7, line 49). The combined teaching clearly provides an HIGH level for the expectations of success. The success of spacing in the 200 angstrom range or smaller is further supported by DiMatteo (US 6084173) which teaches a gap range 0.01 microns (100 angstroms)(col. 3, lines 14-23), where the gap is adjustable by piezoelectric elements. Huffman is only used to provide motivation for utilizing the lower end of the disclosed ranges, that being that the having the smaller electrode spacing provides a qualitative performance due to the tunneling effect (pg 574, first paragraph). Applicant's argument regarding the structure of Huffmans and the performance is not persuasive because the structure is disclosed in Sakouri, and further supported by DiMatteo as cited above. Applicant's argument regarding the prima facie case of obviousness is not persuasive because Sakouri teaches overlapping ranges with the Applicant's claimed range. (See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976) holding "in the case of overlapping ranges disclosed by the prior art, a prima facie case of obviousness exists).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl I.E. Tamai whose telephone number is (571) 272 - 2036.

The examiner can be normally contacted on Monday through Friday from 8:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Darren Schuberg, can be reached at (571) 272 - 2044. The facsimile number for the Group is (571) 273 - 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Karl I Tamai
PRIMARY PATENT EXAMINER
October 23, 2007



KARL TAMAI
PRIMARY EXAMINER